controlled neutral-density wedge. Alternatively, other neutral-density attenuators, such as variable liquid crystal shutters, can be used. If the color temperature of the light source is not a concern, the brightness control circuit can be modified to change the voltage applied to the light source to adjust the latent-image projector's light output without using a neutral-density attenuator.

Although the foregoing discloses the presently preferred embodiments of the present invention, it is understood that those skilled in the art may make various changes to the preferred embodiments shown without departing from the scope of the invention. The invention is defined only by the following claims.

We claim:

1. A latent-image projection system for creating visual images to entertain viewers, comprising:

a viewing screen that diffusely reflects incident light without changing the light's polarization;

a latent-image projector that projects onto the screen a polarization-encoded latent image that is imperceptible to a viewer who directly views the screen, wherein the latent image is associated with a predetermined polarization orientation; and

an analyzer located between the screen and one or more selected viewers, wherein the analyzer has a preferential polarization orientation that is aligned with the predetermined polarization orientation associated with the latent image, so that a selected viewer, who uses the analyzer to view the screen, may perceive the latent image.

2. A latent-image projection system as defined in claim 1, wherein the latent-image projector produces the latent image by directing light having a predetermined illumination pattern through an image area, by altering the light's polarization orientation as it passes through the image area at predetermined locations throughout the image area without perceptibly altering the light's intensity at the predetermined locations, and by projecting the polarization-encoded light passing through the image area onto the screen, thereby creating the latent image on the screen so that only the predetermined illumination pattern, and not the latent image, is perceived by viewers who directly view the screen and so that the latent image is perceived by the selected viewer who views the screen using the analyzer.

3. A latent-image projection system as defined in claim 2, wherein the predetermined illumination pattern has a uniform light intensity so that viewers who directly view the screen see only a uniformly illuminated screen, while the selected viewer, who views the screen using the analyzer, sees the latent image.

4. A latent-image projection system as defined in claim 2, wherein the latent-image projector includes

a light source that uniformly illuminates the image area with a substantially parallel beam of light;

a pre-polarizer that polarizes the light from the light source to a first polarization orientation before the light illuminates the image area;

a transmissive-type liquid crystal matrix located in the image area and having a pixel array that defines the predetermined locations of the image area, wherein the liquid crystal matrix rotates the polarization direction of the light at the predetermined locations in response to an electrical signal received from a video source as the light passes through the liquid crystal matrix to create the polarization-encoded latent image; and

a projection lens that focuses the light passing through the liquid crystal matrix onto the viewing screen.

5. A latent-image projection system as defined in claim 2, wherein the projector includes

a light source that uniformly illuminates the image area with a substantially parallel beam of light;

a pre-polarizer that polarizes the light from the light source to a first polarization orientation before the light illuminates the image area;

an anisotropic medium, located in the image area that rotates the polarization direction of the light at the predetermined locations as the light passes through the medium to create the polarization-encoded latent image; and

a projection lens that focuses the light passing through the medium onto the viewing screen.

6. A latent-image projection system as defined in claim 5, further comprising:

a transparent isotropic substrate that supports the anisotropic medium, wherein the anisotropic medium on the isotropic substrate is a transparent half-wave retarding material that rotates the light's polarization orientation by 90 degrees and the preferential polarization orientation of the analyzer is orthogonal to the polarization orientation of the pre-polarizer.

7. A latent-image projection system as defined in claim 1, wherein the analyzer is a polarizer of transmissive material that is located in a line of sight between the screen and the selected viewer.

8. A latent-image projection system as defined in claim 7, wherein the analyzer is sized such that only a portion of the screen is viewed through the analyzer by the selected viewer thereby producing a magic window special effect.

9. A latent-image projection system as defined in claim 7, wherein:

the analyzer includes a movable support that controllably moves the analyzer; and

the analyzer is sized such that only a portion of the screen is viewed through the analyzer by the selected viewer thereby producing a magic spotlight special effect.

10. A latent-image projection system for creating visual images to entertain viewers, comprising:

a viewing screen that diffusely reflects incident light without changing the light's polarization;

a latent-image projector that projects onto the screen a polarization-encoded latent image that is imperceptible to a viewer who directly views the screen,

wherein the latent image is associated with a predetermined polarization orientation; and

an analyzer located between the screen and one or more selected viewers, wherein the analyzer has a preferential polarization orientation that is aligned with the predetermined polarization orientation associated with the latent image, so that a selected viewer, who uses the analyzer to view the screen, may perceive the latent image, and wherein the analyzer is a specular dielectric surface that is located so that the selected viewer, who views an image of the screen reflected on the dielectric surface at a non-normal angle, may perceive the latent image.

11. A latent-image projection system as defined in claim 10, wherein:

the specular dielectric surface is the surface of a body of water; and

a selected viewer can perceive the latent image by viewing the reflected image of the screen on the surface of the water, but cannot perceive the latent image by directly viewing the screen.